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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/954,864	09/17/2001	Satyadev R. Patel	P68-US	8736
26148	7590	08/24/2004	EXAMINER	
REFLECTIVITY, INC. 350 POTRERO AVENUE SUNNYVALE, CA 94085			OLSEN, ALLAN W	
			ART UNIT	PAPER NUMBER
			1763	

DATE MAILED: 08/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/954,864

Applicant(s)

PATEL ET AL.

Examiner

Allan Olsen

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 24 May 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-133 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-83 123-133 is/are rejected.
- 7) ☒ Claim(s) 84-122 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 May 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### **DETAILED ACTION**

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

#### ***Drawings***

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the reference sign 88 that was mentioned in the amended description of figure 4. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

#### ***Claim Rejections - 35 USC § 112***

**Claims 15-17, 20, 55-57, and 60 are rejected under 35 U.S.C. 112, second paragraph**, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 15-17 and 55 –57 each recite "... the dopant...". There is insufficient antecedent basis for this limitation in these claims.

**Claim Rejections - 35 USC § 102**

**Claims 1-3, 6-14, 28, 34-36, 41-43, 46-54, 68, 74-76, 83 and 124-126 are rejected under 35 U.S.C. 102(a) as being anticipated by the admitted prior art**

Claim 84 recites (with emphasis added):

*"The method of claim 41, the silicon material is part of a silicon portion that is etched relative to a non-silicon portion of the sample, said non-silicon portion consisting of a member selected from the group consisting of a non-silicon metal, a compound of a non-silicon metal, and a silicon-containing compound in which silicon is bonded to a non-silicon element, by exposing both said silicon portion and said non-silicon portion to an etchant gas selected from the group consisting of noble gas fluorides and halogen fluorides, the improvement in which said etchant gas is utilized in the form of a gas mixture in which said etchant gas is mixed with a non-etchant gaseous additive, the partial pressure of said etchant gas in said gas mixture being at least about 0.1 mbar, and the molar ratio of said non-etchant gaseous additive to said etchant gas being from about 1:1 to about 500:1, such that said gas mixture achieves substantially greater etching selectivity toward said silicon portion than would be achieved with said etchant gas alone."*

By virtue of the Jepson format of claim 84, the subject matter of claim 41 constitutes admitted prior art. Claim 41 reads:

*"41. A method for etching a sample comprising a silicon material, comprising providing a vapor phase etchant to the silicon material at a pressure of from .5 to 760 Torr and etching the silicon material at a rate of 20 um/hr or less."*

The following preamble language from claim 84 also constitutes admitted prior art: *"the silicon material is part of a silicon portion that is etched relative to a non-silicon portion of the sample, said non-silicon portion consisting of a member selected from the group consisting of a non-silicon metal, a compound of a non-silicon metal, and a silicon-containing compound in which silicon is bonded to a non-silicon element, by exposing both said silicon portion and said non-silicon portion to an etchant gas selected from the group consisting of noble gas fluorides and halogen fluorides".*

Claims 28, 34-36, 68 and 74-76 are anticipated by the Jepson format of claim 84 in combination with the following disclosure that appears on page 14 of the specification.

*"As can be seen in Toda R., Minami K., and Esashi M., "Thin Beam Bulk Micromachining Based on RIE and Xenon Difluoride Silicon Etching", Transducers '97, IEEE, pp.671-3, Fourier Transform spectroscopy is used to monitor the etching of silicon by xenon difluoride. The process is run in pulse mode where the etchant gas enters the etching chamber at the beginning of the etch, and the etching chamber is evacuated only at the end of the etch. There is a slow build up of SiF<sub>4</sub> in the chamber which gradually forms a plateau as the etch nears completion. With such an arrangement it is very difficult to determine where along the plateau is the proper end point. As stated in the reference, it is considered that the reaction between XeF<sub>2</sub> and silicon is mostly finished within 30 seconds after the SiF<sub>4</sub> absorption peak is nearly saturated."*

**Claim 122 is rejected under 35 U.S.C. 102(b) as being anticipated by US Patent 5,726,480 issued to Pister.**

Pister teaches a method of making a MEMS device that comprises etching a sacrificial layer of polysilicon with XeF<sub>2</sub>. Pister teaches that the etching of polysilicon with XeF<sub>2</sub> is independent of doping.

**Claim 133 is rejected under 35 U.S.C. 102(b) as being clearly anticipated by US Patent 5,994,238 issued to Park.**

See column 3, lines 46-51.

When thermal oxidation was carried out in an atmosphere comprising 1-5 lpm of ozone gas, 150 sccm of anhydrous HF gas and 5 lpm of deionized water vapor, the oxide was etched at a rate of about 11 Å/sec while about an etch rate of 17 Å/sec was obtained for polysilicon, resulting in an etch selection ratio of 1:1.5-1:2.

***Claim Rejections - 35 USC § 103***

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

**Claims 4, 5, 15-19, 27, 34-40, 44, 45, 55-59, 67, 77 and 78 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art.**

The admitted prior art pertains generically to the etching of silicon but does not address the specific type of silicon (e.g., a-Si, poly-Si, PECVD Si, doped Si...) being etched. The admitted prior art does not teach using a mixture of etchants.

It would have been obvious to one skilled in the art to apply the prior art method to all types of silicon because the prior art is directed to the etching of silicon in general rather than to the etching of a specific type of silicon. It would have been obvious to one skilled in the art to use a mixture of etchants, for example XeF<sub>2</sub> and ClF<sub>3</sub> because these etchants are recognized by those skilled in the art as functional equivalents with regard to their ability to etch silicon without plasma excitation.

**Claims 29-33, 69-73 and 77-82 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art in view of U.S. Patent 6,153,115 issued to Le et al.**

The admitted prior art does not disclose data analysis techniques such as smoothing and using either or both of spectral maxima and minima or tracking spectral data derivative plots.

Le teaches a method of analyzing spectral data from a plasma process. Le's method includes data analysis techniques such as smoothing and using either or both of spectral maxima and minima and tracking spectral data derivative plots.

It would have been obvious to one skilled in the art to employ the methods of Le because Le teaches a method that enhances the ability to accurately assess the state of a plasma process.

**Claims 123, 127-132 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pister.**

The teaching of Pister noted above is herein relied upon.

Pister does not teach the particular doping agent or the manner by which the silicon layer is deposited.

The examiner takes Official Notice that claimed dopants (boron and phosphorous and arsenic) and the claimed deposition methods (PECVD, LPCVD and sputtering) are standard methods that one skilled in the art would immediately envisaged upon reading Pister.

***Allowable Subject Matter***

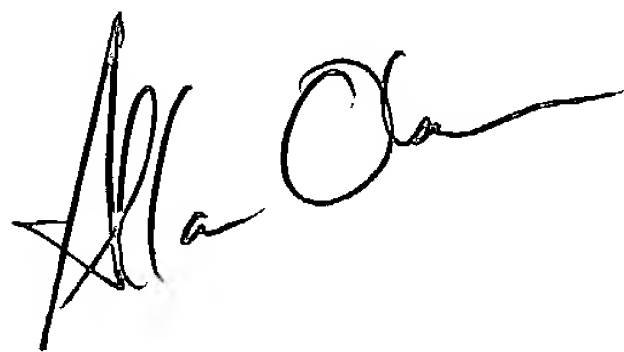
Claims 84-121 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

**Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allan Olsen whose telephone number is 571-272-1441. The examiner can normally be reached on M-F 1-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Greg Mills can be reached on 571-272-1439. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'Allan Olsen', with a stylized flourish at the end.

Allan Olsen  
Primary Examiner  
Art Unit 1763